SEQUENCE LISTING

<110> Roy A. Gravel et al.

<120> HUMAN METHIONINE SYNTHASE REDUCTASE:
CLONING, AND METHODS FOR EVALUATING RISK OF NEURAL TUBE
DEFECTS,CARDIOVASCULAR DISEASE, AND CANCER

<130> 50004/003003

<140> 09/371,347
<141> 1999-08-10

<150> 60/071,622
<151> 1998-01-16

<150> 09/232,028
<151> 1999-01-15

<160> 51

<170> FastSEQ for Windows Version 4.0

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Glu Thr Ala Pro Leu Val Val Val Val Ser Thr Thr Gly Thr Gly Asp
    50                  55                  60
Pro Pro Asp Thr Ala Arg Lys Phe Val Lys Glu Ile Gln Asn Gln Thr
65                  70                  75                  80
Leu Pro Val Asp Phe Phe Ala His Leu Arg Tyr Gly Leu Leu Gly Leu
                85                  90                  95
Gly Asp Ser Glu Tyr Thr Tyr Phe Cys Asn Gly Gly Lys Ile Ile Asp
            100                 105                 110
Lys Arg Leu Gln Glu Leu Gly Ala Arg His Phe Tyr Asp Thr Gly His
        115                 120                 125
Ala Asp Asp Cys Val Gly Leu Glu Leu Val Val Glu Pro Trp Ile Ala
    130                 135                 140
Gly Leu Trp Pro Ala Leu Arg Lys His Phe Arg Ser Ser Arg Gly Gln
145                 150                 155                 160
Glu Glu Ile Ser Gly Ala Leu Pro Val Ala Ser Pro Ala Ser Leu Arg
                165                 170                 175
Thr Asp Leu Val Lys Ser Glu Leu Leu His Ile Glu Ser Gln Val Glu
            180                 185                 190
Leu Leu Arg Phe Asp Asp Ser Gly Arg Lys Asp Ser Glu Val Leu Lys
        195                 200                 205
Gln Asn Ala Val Asn Ser Asn Gln Ser Asn Val Val Ile Glu Asp Phe
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Glu Ser Ser Leu Thr Arg Ser Val Pro Pro Leu Ser Gln Ala Ser Leu
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Val Phe Gln Val Pro Ile Ser Lys Ala Val Gln Leu Thr Thr Asn Asp
275 280 285
Ala Ile Lys Thr Thr Leu Leu Val Glu Leu Asp Ile Ser Asn Thr Asp
290 295 300
Phe Ser Tyr Gln Pro Gly Asp Ala Phe Ser Val Ile Cys Pro Asn Ser
305 310 315 320
Asp Ser Glu Val Gln Ser Leu Leu Gln Arg Leu Gln Leu Glu Asp Lys
325 330 335
Arg Glu His Cys Val Leu Leu Lys Ile Lys Ala Asp Thr Lys Lys Lys
340 345 350
Gly Ala Thr Leu Pro Gln His Ile Pro Ala Gly Cys Ser Leu Gln Phe
355 360 365
Ile Phe Thr Trp Cys Leu Glu Ile Arg Ala Ile Pro Lys Lys Ala Phe
370 375 380
Leu Arg Ala Leu Val Asp Tyr Thr Ser Asp Ser Ala Glu Lys Arg Arg
385 390 395 400
Leu Gln Glu Leu Cys Ser Lys Gln Gly Ala Ala Asp Tyr Ser Arg Phe
405 410 415
Val Arg Asp Ala Cys Ala Cys Leu Leu Asp Leu Leu Leu Ala Phe Pro
420 425 430
Ser Cys Gln Pro Pro Leu Ser Leu Leu Leu Glu His Leu Pro Lys Leu
435 440 445
Gln Pro Arg Pro Tyr Ser Cys Ala Ser Ser Ser Leu Phe His Pro Gly
450 455 460
Lys Leu His Phe Val Phe Asn Ile Val Glu Phe Leu Ser Thr Ala Thr
465 470 475 480
Thr Glu Val Leu Arg Lys Gly Val Cys Thr Gly Trp Leu Ala Leu Leu
485 490 495
Val Ala Ser Val Leu Gln Pro Asn Ile His Ala Ser His Glu Asp Ser
500 505 510
Gly Lys Ala Leu Ala Pro Lys Ile Ser Ile Ser Pro Arg Thr Thr Asn
515 520 525
Ser Phe His Leu Pro Asp Asp Pro Ser Ile Pro Ile Ile Met Val Gly
530 535 540
Pro Gly Thr Gly Ile Ala Pro Phe Ile Gly Phe Leu Gln His Arg Glu
545 550 555 560
Lys Leu Gln Glu Gln His Pro Asp Gly Asn Phe Gly Ala Met Trp Leu
565 570 575
Phe Phe Gly Cys Arg His Lys Asp Arg Asp Tyr Leu Phe Arg Lys Glu
580 585 590
Leu Arg His Phe Leu Lys His Gly Ile Leu Thr His Leu Lys Val Ser
595 600 605
Phe Ser Arg Asp Ala Pro Val Gly Glu Glu Glu Ala Pro Ala Lys Tyr
610 615 620
Val Gln Asp Asn Ile Gln Leu His Gly Gln Gln Val Ala Arg Ile Leu
625 630 635 640

Leu Gln Glu Asn Gly His Ile Tyr Val Cys Gly Asp Ala Lys Asn Met
645 650 655
Ala Lys Asp Val His Asp Ala Leu Val Gln Ile Ile Ser Lys Glu Val
660 665 670
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<400> 17
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<400> 19
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<210> 20
<211> 25
<212> DNA
<213> Homo sapiens

<400> 20
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<210> 21
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Ala Asp Leu His Cys Ile Ser Glu Ser Asp Lys Tyr Asp Leu Lys Thr
        35   40   45
Glu Thr Ala Pro Leu Val Val Val Val Ser Thr Thr Gly Thr Gly Asp
    50   55   60
Pro Pro Asp Thr Ala Arg Lys Phe Val Lys Glu Ile Gln Asn Gln Thr
65   70   75   80
Leu Pro Val Asp Phe Phe Ala His Leu Arg Tyr Gly Leu Leu Gly Leu
                85   90   95
Gly Asp Ser Glu Tyr Thr Tyr Phe Cys Asn Gly Gly Lys Ile Ile Asp
            100   105   110
Lys Arg Leu Gln Glu Leu Gly Ala Arg His Phe Tyr Asp Thr Gly His
        115   120   125
Ala Asp Asp Cys Val Gly Leu Glu Leu Val Val Glu Pro Trp Ile Ala
    130   135   140
Gly Leu Trp Pro Ala Leu Arg Lys His Phe Arg Ser Ser Arg Gly Gln
145   150   155   160
Glu Glu Ile Ser Gly Ala Leu Pro Val Ala Ser Pro Ala Ser Leu Arg
                165   170   175
Thr Asp Leu Val Lys Ser Glu Leu Leu His Ile Glu Ser Gln Val Glu
            180   185   190
Leu Leu Arg Phe Asp Asp Ser Gly Arg Lys Asp Ser Glu Val Leu Lys
        195   200   205
Gln Asn Ala Val Asn Ser Asn Gln Ser Asn Val Val Ile Glu Asp Phe
    210   215   220
Glu Ser Ser Leu Thr Arg Ser Val Pro Pro Leu Ser Gln Ala Ser Leu
225   230   235   240
Asn Ile Pro Gly Leu Pro Pro Glu Tyr Leu Gln Val His Leu Gln Glu
                245   250   255
Ser Leu Gly Gln Glu Glu Ser Gln Val Ser Val Thr Ser Ala Asp Pro
            260   265   270
Val Phe Gln Val Pro Ile Ser Lys Ala Val Gln Leu Thr Thr Asn Asp
        275   280   285
Ala Ile Lys Thr Thr Leu Leu Val Glu Leu Asp Ile Ser Asn Thr Asp
    290   295   300
Phe Ser Tyr Gln Pro Gly Asp Ala Phe Ser Val Ile Cys Pro Asn Ser
305   310   315   320
Asp Ser Glu Val Gln Ser Leu Leu Gln Arg Leu Gln Leu Glu Asp Lys
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Arg Glu His Cys Val Leu Leu Lys Ile Lys Ala Asp Thr Lys Lys Lys
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Gly Ala Thr Leu Pro Gln His Ile Pro Ala Gly Cys Ser Leu Gln Phe

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Leu Gln Glu Leu Cys Ser Lys Gln Gly Ala Ala Asp Tyr Ser Arg Phe
                405                 410                 415
Val Arg Asp Ala Cys Ala Cys Leu Leu Asp Leu Leu Leu Ala Phe Pro
            420                 425                 430
Ser Cys Gln Pro Pro Leu Ser Leu Leu Leu Glu His Leu Pro Lys Leu
        435                 440                 445
Gln Pro Arg Pro Tyr Ser Cys Ala Ser Ser Ser Leu Phe His Pro Gly
    450                 455                 460
Lys Leu His Phe Val Phe Asn Ile Val Glu Phe Leu Ser Thr Ala Thr
465                 470                 475                 480
Thr Glu Val Leu Arg Lys Gly Val Cys Thr Gly Trp Leu Ala Leu Leu
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Val Ala Ser Val Leu Gln Pro Asn Ile His Ala Ser His Glu Asp Ser
            500                 505                 510
Gly Lys Ala Leu Ala Pro Lys Ile Ser Ile Ser Pro Arg Thr Thr Asn
        515                 520                 525
Ser Phe His Leu Pro Asp Asp Pro Ser Ile Pro Ile Ile Met Val Gly
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Pro Gly Thr Gly Ile Ala Pro Phe Ile Gly Phe Leu Gln His Arg Glu
545                 550                 555                 560
Lys Leu Gln Glu Gln His Pro Asp Gly Asn Phe Gly Ala Met Trp Leu
                565                 570                 575
Phe Phe Gly Cys Arg His Lys Asp Arg Asp Tyr Leu Phe Arg Lys Glu
            580                 585                 590
Leu Arg His Phe Leu Lys His Gly Ile Leu Thr His Leu Lys Val Ser
        595                 600                 605
Phe Ser Arg Asp Ala Pro Val Gly Glu Glu Glu Ala Pro Ala Lys Tyr
    610                 615                 620
Val Gln Asp Asn Ile Gln Leu His Gly Gln Gln Val Ala Arg Ile Leu
625                 630                 635                 640
Leu Gln Glu Asn Gly His Ile Tyr Val Cys Gly Asp Ala Lys Asn Met
                645                 650                 655
Ala Lys Asp Val His Asp Ala Leu Val Gln Ile Ile Ser Lys Glu Val
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Gly Val Glu Lys Leu Glu Ala Met Lys Thr Leu Ala Thr Leu Lys Glu
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Glu Lys Arg Tyr Leu Gln Asp Ile Trp Ser
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<213> Caenorhabditis elegans

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        35                  40                  45
Glu Glu Lys Leu Cys Ala Ile Val Val Ser Ser Thr Gly Asp Gly Asp
    50                  55                  60
Ala Pro Asp Asn Cys Ala Arg Phe Val Arg Arg Ile Asn Arg Asn Ser
65                  70                  75                  80
Leu Glu Asn Glu Tyr Leu Lys Asn Leu Asp Tyr Val Leu Leu Gly Leu
                85                  90                  95
Gly Asp Ser Asn Tyr Ser Ser Tyr Gln Thr Ile Pro Arg Lys Ile Asp
            100                 105                 110
Lys Gln Leu Thr Ala Leu Gly Ala Asn Arg Leu Phe Asp Arg Ala Glu
        115                 120                 125
Ala Asp Asp Gln Val Gly Leu Glu Leu Glu Val Glu Pro Trp Ile Glu
    130                 135                 140
Lys Phe Phe Ala Thr Leu Ala Ser Arg Phe Asp Ile Ser Ala Asp Lys
145                 150                 155                 160
Met Asn Ala Ile Thr Glu Ser Ser Asn Leu Lys Leu Asn Gln Val Lys
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Thr Glu Glu Glu Lys Lys Ala Leu Leu Gln Lys Arg Ile Glu Asp Glu
            180                 185                 190
Glu Ser Asp Asp Glu Gly Arg Gly Arg Val Ile Gly Ile Asp Met Leu
        195                 200                 205
Ile Pro Glu His Tyr Asp Tyr Pro Glu Ile Ser Leu Leu Lys Gly Ser
    210                 215                 220
Gln Thr Leu Ser Asn Asp Glu Asn Leu Arg Val Pro Ile Ala Pro Gln
225                 230                 235                 240
Pro Phe Ile Val Ser Ser Val Ser Asn Arg Lys Leu Pro Glu Asp Thr
                245                 250                 255
Lys Leu Glu Trp Gln Asn Leu Cys Lys Met Pro Gly Val Val Thr Lys
            260                 265                 270
Pro Phe Glu Val Leu Val Val Ser Ala Glu Phe Val Thr Asp Pro Phe
        275                 280                 285
Ser Lys Lys Ile Lys Thr Lys Arg Met Ile Thr Val Asp Phe Gly Asp
    290                 295                 300
His Ala Ala Glu Leu Gln Tyr Glu Pro Gly Asp Ala Ile Tyr Phe Cys
305                 310                 315                 320
Val Pro Asn Pro Ala Leu Glu Val Asn Phe Ile Leu Lys Arg Cys Gly
                325                 330                 335
Val Leu Asp Ile Ala Asp Gln Gln Cys Glu Leu Ser Ile Asn Pro Lys
            340                 345                 350
Thr Glu Lys Ile Asn Ala Gln Ile Pro Gly His Val His Lys Ile Thr
        355                 360                 365
Thr Leu Arg His Met Phe Thr Thr Cys Leu Asp Ile Arg Arg Ala Pro
    370                 375                 380
Gly Arg Pro Leu Ile Arg Val Leu Ala Glu Ser Thr Ser Asp Pro Asn
385                 390                 395                 400
Glu Lys Arg Arg Leu Leu Glu Leu Cys Ser Ala Gln Gly Met Lys Asp
                405                 410                 415
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Phe Thr Asp Phe Val Arg Thr Pro Gly Leu Ser Leu Ala Asp Met Leu
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Phe Ala Phe Pro Asn Val Lys Pro Pro Val Asp Arg Leu Ile Glu Leu
435 440 445
Leu Pro Arg Leu Ile Pro Arg Pro Tyr Ser Met Ser Ser Tyr Glu Asn
450 455 460
Arg Lys Ala Arg Leu Ile Tyr Ser Glu Met Glu Phe Pro Ala Thr Asp
465 470 475 480
Gly Arg Arg His Ser Arg Lys Gly Leu Ala Thr Asp Trp Leu Asn Ser
485 490 495
Leu Arg Ile Gly Asp Lys Val Gln Val Leu Gly Lys Glu Pro Ala Arg
500 505 510
Phe Arg Leu Pro Pro Leu Gly Met Thr Lys Asn Ser Ala Gly Lys Leu
515 520 525
Pro Leu Leu Met Val Gly Pro Gly Thr Gly Val Ser Val Phe Leu Ser
530 535 540
Phe Leu His Phe Leu Arg Lys Leu Lys Gln Asp Ser Pro Ser Asp Phe
545 550 555 560
Val Asp Val Pro Arg Val Leu Phe Phe Gly Cys Arg Asp Ser Ser Val
565 570 575
Asp Ala Ile Tyr Met Ser Glu Leu Glu Met Phe Val Ser Glu Gly Ile
580 585 590
Leu Thr Asp Leu Ile Ile Cys Glu Ser Glu Gln Lys Gly Glu Arg Val
595 600 605
Gln Asp Gly Leu Arg Lys Tyr Leu Asp Lys Val Leu Pro Phe Leu Thr
610 615 620
Ala Ser Thr Glu Ser Lys Ile Phe Ile Cys Gly Asp Ala Lys Gly Met
625 630 635 640
Ser Lys Asp Val Trp Gln Cys Phe Ser Asp Ile Val Ala Ser Asp Gln
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<213> Homo sapiens

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35 40 45
Glu Glu Val Pro Glu Phe Thr Lys Ile Gln Thr Leu Thr Ser Ser Val
50 55 60
Arg Glu Ser Ser Phe Val Glu Lys Met Lys Lys Thr Gly Arg Asn Ile
65 70 75 80

Ile Val Phe Tyr Gly Ser Gln Thr Gly Thr Ala Glu Glu Phe Ala Asn
85 90 95
Arg Leu Ser Lys Asp Ala His Arg Tyr Gly Met Arg Gly Met Ser Ala
100 105 110
Asp Pro Glu Glu Tyr Asp Leu Ala Asp Leu Ser Ser Leu Pro Glu Ile
115 120 125
Asp Asn Ala Leu Val Val Phe Cys Met Ala Thr Tyr Gly Glu Gly Asp
130 135 140
Pro Thr Asp Asn Ala Gln Asp Phe Tyr Asp Trp Leu Gln Glu Thr Asp
145 150 155 160
Val Asp Leu Ser Gly Val Lys Phe Ala Val Phe Gly Leu Gly Asn Lys
165 170 175
Thr Tyr Glu His Phe Asn Ala Met Gly Lys Tyr Val Asp Lys Arg Leu
180 185 190
Glu Gln Leu Gly Ala Gln Arg Ile Phe Glu Leu Gly Leu Gly Asp Asp
195 200 205
Asp Gly Asn Leu Glu Glu Asp Phe Ile Thr Trp Arg Glu Gln Phe Trp
210 215 220
Pro Ala Val Cys Glu His Phe Gly Val Glu Ala Thr Gly Glu Glu Ser
225 230 235 240
Ser Ile Arg Gln Tyr Glu Leu Val Val His Thr Asp Ile Asp Ala Ala
245 250 255
Lys Val Tyr Met Gly Glu Met Gly Arg Leu Lys Ser Tyr Glu Asn Gln
260 265 270
Lys Pro Pro Phe Asp Ala Lys Asn Pro Phe Leu Ala Ala Val Thr Thr
275 280 285
Asn Arg Lys Leu Asn Gln Gly Thr Glu Arg His Leu Met His Leu Glu
290 295 300
Leu Asp Ile Ser Asp Ser Lys Ile Arg Tyr Glu Ser Gly Asp His Val
305 310 315 320
Ala Val Tyr Pro Ala Asn Asp Ser Ala Leu Val Asn Gln Leu Gly Lys
325 330 335
Ile Leu Gly Ala Asp Leu Asp Val Val Met Ser Leu Asn Asn Leu Asp
340 345 350
Glu Glu Ser Asn Lys Lys His Pro Phe Pro Cys Pro Thr Ser Tyr Arg
355 360 365
Thr Ala Leu Thr Tyr Tyr Leu Asp Ile Thr Asn Pro Pro Arg Thr Asn
370 375 380
Val Leu Tyr Glu Leu Ala Gln Tyr Ala Ser Glu Pro Ser Glu Gln Glu
385 390 395 400
Leu Leu Arg Lys Met Ala Ser Ser Ser Gly Glu Gly Lys Glu Leu Tyr
405 410 415
Leu Ser Trp Val Val Glu Ala Arg Arg His Ile Leu Ala Ile Leu Gln
420 425 430
Asp Cys Pro Ser Leu Arg Pro Pro Ile Asp His Leu Cys Glu Leu Leu
435 440 445
Pro Arg Leu Gln Ala Arg Tyr Tyr Ser Ile Ala Ser Ser Ser Lys Val
450 455 460
His Pro Asn Ser Val His Ile Cys Ala Val Val Val Glu Tyr Glu Thr
465 470 475 480
Lys Ala Gly Arg Ile Asn Lys Gly Val Ala Thr Asn Trp Leu Arg Ala

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Val Arg Lys Ser Gln Phe Arg Leu Pro Phe Lys Ala Thr Thr Pro Val
        515                 520                 525
Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Ile Gly Phe Ile
    530                 535                 540
Gln Glu Arg Ala Trp Leu Arg Gln Gln Gly Lys Glu Val Gly Glu Thr
545                 550                 555                 560
Leu Leu Tyr Tyr Gly Cys Arg Arg Ser Asp Glu Asp Tyr Leu Tyr Arg
                565                 570                 575
Glu Glu Leu Ala Gln Phe His Arg Asp Gly Ala Leu Thr Gln Leu Asn
            580                 585                 590
Val Ala Phe Ser Arg Glu Gln Ser His Lys Val Tyr Val Gln His Leu
        595                 600                 605
Leu Lys Gln Asp Arg Glu His Leu Trp Lys Leu Ile Glu Gly Gly Ala
    610                 615                 620
His Ile Tyr Val Cys Gly Asp Ala Arg Asn Met Ala Arg Asp Val Gln
625                 630                 635                 640
Asn Thr Phe Tyr Asp Ile Val Ala Glu Leu Gly Ala Met Glu His Ala
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Gln Ala Val Asp Tyr Ile Lys Lys Leu Met Thr Lys Gly Arg Tyr Ser
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Leu Asp Val Trp Ser
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<400> 24

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tcttcactgt attagtgaat ccgataagta tgacctaaaa accgaaacag ctcctcttgt     240
tgttgtggtt tctaccacgg gcaccggaga cccacccgac acagcccgca agtttgttaa     300
ggaaatacag aaccaaacac tgccggttga tttctttgct cacctgcggt atgggttact     360
gggtctcggt gattcagaat acacctactt ttgcaatggg gggaagataa ttgataaacg     420
acttcaagag cttggagccc ggcatttcta tgacactgga catgcagatg actgtgtagg     480
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<213> Homo sapiens

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<210> 26
<211> 18
<212> PRT

<213> Homo sapiens

<400> 26
Gly Glu Thr Leu Leu Tyr Tyr Gly Cys Arg Arg Ser Asp Glu Asp Tyr
 1   5   10   15
Leu Tyr

<210> 27
<211> 18
<212> PRT
<213> Oryctolagus cuniculus

<400> 27
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 1   5   10   15
Leu Tyr

<210> 28
<211> 18
<212> PRT
<213> Drosophila melanogaster

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Ile Tyr

<210> 29
<211> 18
<212> PRT
<213> Vigna radiata

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Ile Tyr

<210> 30
<211> 18
<212> PRT
<213> Aspergillus niger

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Leu Tyr

<210> 31
<211> 18
<212> PRT
<213> Homo sapiens

<400> 31
Cys Pro Met Val Leu Val Phe Gly Cys Arg Gln Ser Lys Ile Asp His
 1   5   10   15
Ile Tyr

<210> 32
<211> 18
<212> PRT
<213> Homo sapiens

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Gly Arg Met Thr Leu Val Phe Gly Cys Arg Arg Pro Asp Glu Asp His
 1   5   10   15
Ile Tyr

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<211> 18
<212> PRT
<213> Homo sapiens

<400> 33
Thr Pro Met Thr Leu Val Phe Gly Cys Arg Cys Ser Gln Leu Asp His
 1   5   10   15
Leu Tyr

<210> 34
<211> 18
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<213> Oryctolagus cuniculus

<400> 34
Gly Arg Met Thr Leu Val Phe Gly Cys Arg His Pro Glu Glu Asp His
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Leu Tyr

<210> 35
<211> 18
<212> PRT
<213> Gallus gallus

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Gly Asp Met Ile Leu Leu Phe Gly Cys Arg His Pro Asp Met Asp His

1 5 10 15
Ile Tyr

<210> 36
<211> 18
<212> PRT
<213> Escherichia coli

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Gly Lys Asn Trp Leu Phe Phe Gly Asn Pro His Phe Thr Glu Asp Phe
1 5 10 15
Leu Tyr

<210> 37
<211> 18
<212> PRT
<213> Saccharomyces cerevisiae

<400> 37
Gly Glu Val Phe Leu Tyr Leu Gly Ser Arg His Lys Arg Glu Glu Tyr
1 5 10 15
Leu Tyr

<210> 38
<211> 18
<212> PRT
<213> Thiocapsa roseopersicina

<400> 38
Gly Arg Asn Trp Leu Ile Phe Gly Asn Arg His Phe His Arg Asp Phe
1 5 10 15
Leu Tyr

<210> 39
<211> 19
<212> PRT
<213> Pisum sativum

<400> 39
Gly Leu Ala Trp Leu Phe Leu Gly Val Ala Asn Val Asp Ser Leu Leu
1 5 10 15
Tyr Asp Asp

<210> 40
<211> 18
<212> PRT

<213> Spinacia oleracea

<400> 40
Gly Leu Ala Trp Leu Phe Leu Gly Val Pro Thr Ser Ser Ser Leu Leu
 1   5   10   15
Tyr Lys

<210> 41
<211> 2097
<212> DNA
<213> Homo sapiens

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<210> 42

<211> 698
<212> PRT
<213> Homo sapiens

<400> 42

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            20                  25                  30
Ala Asp Leu His Cys Ile Ser Glu Ser Asp Lys Tyr Asp Leu Lys Thr
        35                  40                  45
Glu Thr Ala Pro Leu Val Val Val Val Ser Thr Thr Gly Thr Gly Asp
    50                  55                  60
Pro Pro Asp Thr Ala Arg Lys Phe Val Lys Glu Ile Gln Asn Gln Thr
65                  70                  75                  80
Leu Pro Val Asp Phe Phe Ala His Leu Arg Tyr Gly Leu Leu Gly Leu
                85                  90                  95
Gly Asp Ser Glu Tyr Thr Tyr Phe Cys Asn Gly Gly Lys Ile Ile Asp
            100                 105                 110
Lys Arg Leu Gln Glu Leu Gly Ala Arg His Phe Tyr Asp Thr Gly His
        115                 120                 125
Ala Asp Asp Cys Val Gly Leu Glu Leu Val Val Glu Pro Trp Ile Ala
    130                 135                 140
Gly Leu Trp Pro Ala Leu Arg Lys His Phe Arg Ser Ser Arg Gly Gln
145                 150                 155                 160
Glu Glu Ile Ser Gly Ala Leu Pro Val Ala Ser Pro Ala Ser Leu Arg
                165                 170                 175
Thr Asp Leu Val Lys Ser Glu Leu Leu His Ile Glu Ser Gln Val Glu
            180                 185                 190
Leu Leu Arg Phe Asp Asp Ser Gly Arg Lys Asp Ser Glu Val Leu Lys
        195                 200                 205
Gln Asn Ala Val Asn Ser Asn Gln Ser Asn Val Val Ile Glu Asp Phe
    210                 215                 220
Glu Ser Ser Leu Thr Arg Ser Val Pro Pro Leu Ser Gln Ala Ser Leu
225                 230                 235                 240
Asn Ile Pro Gly Leu Pro Pro Glu Tyr Leu Gln Val His Leu Gln Glu
                245                 250                 255
Ser Leu Gly Gln Glu Glu Ser Gln Val Ser Val Thr Ser Ala Asp Pro
            260                 265                 270
Val Phe Gln Val Pro Ile Ser Lys Ala Val Gln Leu Thr Thr Asn Asp
        275                 280                 285
Ala Ile Lys Thr Thr Leu Leu Val Glu Leu Asp Ile Ser Asn Thr Asp
    290                 295                 300
Phe Ser Tyr Gln Pro Gly Asp Ala Phe Ser Val Ile Cys Pro Asn Ser
305                 310                 315                 320
Asp Ser Glu Val Gln Ser Leu Leu Gln Arg Leu Gln Leu Glu Asp Lys
                325                 330                 335
Arg Glu His Cys Val Leu Leu Lys Ile Lys Ala Asp Thr Lys Lys Lys
            340                 345                 350
Gly Ala Thr Leu Pro Gln His Ile Pro Ala Gly Cys Ser Leu Gln Phe
        355                 360                 365
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Ile Phe Thr Trp Cys Leu Glu Ile Arg Ala Ile Pro Lys Lys Ala Phe
    370                 375                 380
Leu Arg Ala Leu Val Asp Tyr Thr Ser Asp Ser Ala Glu Lys Arg Arg
385                 390                 395                 400
Leu Gln Glu Leu Cys Ser Lys Gln Gly Ala Ala Asp Tyr Ser Arg Phe
                405                 410                 415
Val Arg Asp Ala Cys Ala Cys Leu Leu Asp Leu Leu Leu Ala Phe Pro
            420                 425                 430
Ser Cys Gln Pro Pro Leu Ser Leu Leu Leu Glu His Leu Pro Lys Leu
        435                 440                 445
Gln Pro Arg Pro Tyr Ser Cys Ala Ser Ser Ser Leu Phe His Pro Gly
    450                 455                 460
Lys Leu His Phe Val Phe Asn Ile Val Glu Phe Leu Ser Thr Ala Thr
465                 470                 475                 480
Thr Glu Val Leu Arg Lys Gly Val Cys Thr Gly Trp Leu Ala Leu Leu
                485                 490                 495
Val Ala Ser Val Leu Gln Pro Asn Ile His Ala Ser His Glu Asp Ser
            500                 505                 510
Gly Lys Ala Leu Ala Pro Lys Ile Ser Ile Ser Pro Arg Thr Thr Asn
        515                 520                 525
Ser Phe His Leu Pro Asp Asp Pro Ser Ile Pro Ile Ile Met Val Gly
    530                 535                 540
Pro Gly Thr Gly Ile Ala Pro Phe Ile Gly Phe Leu Gln His Arg Glu
545                 550                 555                 560
Lys Leu Gln Glu Gln His Pro Asp Gly Asn Phe Gly Ala Met Trp Leu
                565                 570                 575
Phe Phe Gly Cys Arg His Lys Asp Arg Asp Tyr Leu Phe Arg Lys Glu
            580                 585                 590
Leu Arg His Phe Leu Lys His Gly Ile Leu Thr His Leu Lys Val Ser
        595                 600                 605
Phe Ser Arg Asp Ala Pro Val Gly Glu Glu Glu Ala Pro Ala Lys Tyr
    610                 615                 620
Val Gln Asp Asn Ile Gln Leu His Gly Gln Gln Val Ala Arg Ile Leu
625                 630                 635                 640
Leu Gln Glu Asn Gly His Ile Tyr Val Cys Gly Asp Ala Lys Asn Met
                645                 650                 655
Ala Lys Asp Val His Asp Ala Leu Val Gln Ile Ile Ser Lys Glu Val
            660                 665                 670
Gly Val Glu Lys Leu Glu Ala Met Lys Thr Leu Ala Thr Leu Lys Glu
        675                 680                 685
Glu Lys Arg Tyr Leu Gln Asp Ile Trp Ser
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<210> 43
<211> 2097
<212> DNA
<213> Homo sapiens

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catgatgccc ttgtgcaaat aataagcaaa gaggttggag ttgaaaaact agaagcaatg    2040
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<210> 44
<211> 698
<212> PRT
<213> Homo sapiens

<400> 44

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            20                  25                  30
Ala Asp Leu His Thr Ile Ser Glu Ser Asp Lys Tyr Asp Leu Lys Thr
        35                  40                  45
Glu Thr Ala Pro Leu Val Val Val Val Ser Thr Thr Gly Thr Gly Asp
    50                  55                  60
Pro Pro Asp Thr Ala Arg Lys Phe Val Lys Glu Ile Gln Asn Gln Thr
65                  70                  75                  80
Leu Pro Val Asp Phe Phe Ala His Leu Arg Tyr Gly Leu Leu Gly Leu
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                85                  90                  95
Gly Asp Ser Glu Tyr Thr Tyr Phe Cys Asn Gly Gly Lys Ile Ile Asp
            100                 105                 110
Lys Arg Leu Gln Glu Leu Gly Ala Arg His Phe Tyr Asp Thr Gly His
        115                 120                 125
Ala Asp Asp Cys Val Gly Leu Glu Leu Val Val Glu Pro Trp Ile Ala
    130                 135                 140
Gly Leu Trp Pro Ala Leu Arg Lys His Phe Arg Ser Ser Arg Gly Gln
145                 150                 155                 160
Glu Glu Ile Ser Gly Ala Leu Pro Val Ala Ser Pro Ala Ser Leu Arg
                165                 170                 175
Thr Asp Leu Val Lys Ser Glu Leu Leu His Ile Glu Ser Gln Val Glu
            180                 185                 190
Leu Leu Arg Phe Asp Asp Ser Gly Arg Lys Asp Ser Glu Val Leu Lys
        195                 200                 205
Gln Asn Ala Val Asn Ser Asn Gln Ser Asn Val Val Ile Glu Asp Phe
    210                 215                 220
Glu Ser Ser Leu Thr Arg Ser Val Pro Pro Leu Ser Gln Ala Ser Leu
225                 230                 235                 240
Asn Ile Pro Gly Leu Pro Pro Glu Tyr Leu Gln Val His Leu Gln Glu
                245                 250                 255
Ser Leu Gly Gln Glu Glu Ser Gln Val Ser Val Thr Ser Ala Asp Pro
            260                 265                 270
Val Phe Gln Val Pro Ile Ser Lys Ala Val Gln Leu Thr Thr Asn Asp
        275                 280                 285
Ala Ile Lys Thr Thr Leu Leu Val Glu Leu Asp Ile Ser Asn Thr Asp
    290                 295                 300
Phe Ser Tyr Gln Pro Gly Asp Ala Phe Ser Val Ile Cys Pro Asn Ser
305                 310                 315                 320
Asp Ser Glu Val Gln Ser Leu Leu Gln Arg Leu Gln Leu Glu Asp Lys
                325                 330                 335
Arg Glu His Cys Val Leu Leu Lys Ile Lys Ala Asp Thr Lys Lys Lys
            340                 345                 350
Gly Ala Thr Leu Pro Gln His Ile Pro Ala Gly Cys Ser Leu Gln Phe
        355                 360                 365
Ile Phe Thr Trp Cys Leu Glu Ile Arg Ala Ile Pro Lys Lys Ala Phe
    370                 375                 380
Leu Arg Ala Leu Val Asp Tyr Thr Ser Asp Ser Ala Glu Lys Arg Arg
385                 390                 395                 400
Leu Gln Glu Leu Cys Ser Lys Gln Gly Ala Ala Asp Tyr Ser Arg Phe
                405                 410                 415
Val Arg Asp Ala Cys Ala Cys Leu Leu Asp Leu Leu Leu Ala Phe Pro
            420                 425                 430
Ser Cys Gln Pro Pro Leu Ser Leu Leu Leu Glu His Leu Pro Lys Leu
        435                 440                 445
Gln Pro Arg Pro Tyr Ser Cys Ala Ser Ser Ser Leu Phe His Pro Gly
    450                 455                 460
Lys Leu His Phe Val Phe Asn Ile Val Glu Phe Leu Ser Thr Ala Thr
465                 470                 475                 480
Thr Glu Val Leu Arg Lys Gly Val Cys Thr Gly Trp Leu Ala Leu Leu
                485                 490                 495
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Val Ala Ser Val Leu Gln Pro Asn Ile His Ala Ser His Glu Asp Ser
            500                 505                 510
Gly Lys Ala Leu Ala Pro Lys Ile Ser Ile Ser Pro Arg Thr Thr Asn
        515                 520                 525
Ser Phe His Leu Pro Asp Asp Pro Ser Ile Pro Ile Ile Met Val Gly
    530                 535                 540
Pro Gly Thr Gly Ile Ala Pro Phe Ile Gly Phe Leu Gln His Arg Glu
545                 550                 555                 560
Lys Leu Gln Glu Gln His Pro Asp Gly Asn Phe Gly Ala Met Trp Leu
                565                 570                 575
Phe Phe Gly Cys Arg His Lys Asp Arg Asp Tyr Leu Phe Arg Lys Glu
            580                 585                 590
Leu Arg His Phe Leu Lys His Gly Ile Leu Thr His Leu Lys Val Ser
        595                 600                 605
Phe Ser Arg Asp Ala Pro Val Gly Glu Glu Glu Ala Pro Ala Lys Tyr
    610                 615                 620
Val Gln Asp Asn Ile Gln Leu His Gly Gln Gln Val Ala Arg Ile Leu
625                 630                 635                 640
Leu Gln Glu Asn Gly His Ile Tyr Val Cys Gly Asp Ala Lys Asn Met
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Ala Lys Asp Val His Asp Ala Leu Val Gln Ile Ile Ser Lys Glu Val
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Gly Val Glu Lys Leu Glu Ala Met Lys Thr Leu Ala Thr Leu Lys Glu
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Glu Lys Arg Tyr Leu Gln Asp Ile Trp Ser
    690                 695
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<210> 45
<211> 2094
<212> DNA
<213> Homo sapiens

<400> 45

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tccgataagt atgacctaaa aaccgaaaca gctcctcttg ttgttgtggt ttctaccacg     180
ggcaccggag acccacccga cacagcccgc aagtttgtta aggaaataca gaaccaaaca     240
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cggcatttct atgacactgg acatgcagat gactgtgtag gtttagaact tgtggttgag     420
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gaggagataa gtggcgcact cccggtggca tcacctgcat ccttgaggac agaccttgtg     540
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gattctgagg tacaaagcct actccaaaga ctgcagcttg aagataaaag agagcactgc    1020
gtccttttga aaataaaggc agacacaaag aagaaaggag ctaccttacc ccagcatata    1080
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cctgcgggat gttctctcca gttcattttt acctggtgtc ttgaaatccg agcaattcct    1140
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ttaactcatc taaaggtttc cttctcaaga gatgctcctg ttggggagga ggaagcccca    1860
gcaaagtatg tacaagacaa catccagctt catggccagc aggtggcgag aatcctcctc    1920
caggagaacg gccatattta tgtgtgtgga gatgcaaaga atatggccaa ggatgtacat    1980
gatgcccttg tgcaaataat aagcaaagag gttggagttg aaaaactaga agcaatgaaa    2040
accctggcca ctttaaaaga agaaaaacgc taccttcagg atatttggtc ataa          2094
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<210> 46
<211> 697
<212> PRT
<213> Homo sapiens

<400> 46

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            20                  25                  30
Ala Asp Leu His Cys Ile Ser Glu Ser Asp Lys Tyr Asp Leu Lys Thr
        35                  40                  45
Glu Thr Ala Pro Leu Val Val Val Val Ser Thr Thr Gly Thr Gly Asp
    50                  55                  60
Pro Pro Asp Thr Ala Arg Lys Phe Val Lys Glu Ile Gln Asn Gln Thr
65                  70                  75                  80
Leu Pro Val Asp Phe Phe Ala His Leu Arg Tyr Gly Leu Leu Gly Leu
                85                  90                  95
Gly Asp Ser Glu Tyr Thr Tyr Phe Cys Asn Gly Gly Lys Ile Ile Asp
            100                 105                 110
Lys Arg Leu Gln Glu Leu Gly Ala Arg His Phe Tyr Asp Thr Gly His
        115                 120                 125
Ala Asp Asp Cys Val Gly Leu Glu Leu Val Val Glu Pro Trp Ile Ala
    130                 135                 140
Gly Leu Trp Pro Ala Leu Arg Lys His Phe Arg Ser Ser Arg Gly Gln
145                 150                 155                 160
Glu Glu Ile Ser Gly Ala Leu Pro Val Ala Ser Pro Ala Ser Leu Arg
                165                 170                 175
Thr Asp Leu Val Lys Ser Glu Leu Leu His Ile Glu Ser Gln Val Glu
            180                 185                 190
Leu Leu Arg Phe Asp Asp Ser Gly Arg Lys Asp Ser Glu Val Leu Lys
        195                 200                 205
Gln Asn Ala Val Asn Ser Asn Gln Ser Asn Val Val Ile Glu Asp Phe
```

```
    210                 215                 220
Glu Ser Ser Leu Thr Arg Ser Val Pro Pro Leu Ser Gln Ala Ser Leu
225                 230                 235                 240
Asn Ile Pro Gly Leu Pro Pro Glu Tyr Leu Gln Val His Leu Gln Glu
                245                 250                 255
Ser Leu Gly Gln Glu Glu Ser Gln Val Ser Val Thr Ser Ala Asp Pro
            260                 265                 270
Val Phe Gln Val Pro Ile Ser Lys Ala Val Gln Leu Thr Thr Asn Asp
        275                 280                 285
Ala Ile Lys Thr Thr Leu Leu Val Glu Leu Asp Ile Ser Asn Thr Asp
    290                 295                 300
Phe Ser Tyr Gln Pro Gly Asp Ala Phe Ser Val Ile Cys Pro Asn Ser
305                 310                 315                 320
Asp Ser Glu Val Gln Ser Leu Leu Gln Arg Leu Gln Leu Glu Asp Lys
                325                 330                 335
Arg Glu His Cys Val Leu Leu Lys Ile Lys Ala Asp Thr Lys Lys Lys
            340                 345                 350
Gly Ala Thr Leu Pro Gln His Ile Pro Ala Gly Cys Ser Leu Gln Phe
        355                 360                 365
Ile Phe Thr Trp Cys Leu Glu Ile Arg Ala Ile Pro Lys Lys Ala Phe
    370                 375                 380
Leu Arg Ala Leu Val Asp Tyr Thr Ser Asp Ser Ala Glu Lys Arg Arg
385                 390                 395                 400
Leu Gln Glu Leu Cys Ser Lys Gln Gly Ala Ala Asp Tyr Ser Arg Phe
                405                 410                 415
Val Arg Asp Ala Cys Ala Cys Leu Leu Asp Leu Leu Leu Ala Phe Pro
            420                 425                 430
Ser Cys Gln Pro Pro Leu Ser Leu Leu Leu Glu His Leu Pro Lys Leu
        435                 440                 445
Gln Pro Arg Pro Tyr Ser Cys Ala Ser Ser Ser Leu Phe His Pro Gly
    450                 455                 460
Lys Leu His Phe Val Phe Asn Ile Val Glu Phe Leu Ser Thr Ala Thr
465                 470                 475                 480
Thr Glu Val Leu Arg Lys Gly Val Cys Thr Gly Trp Leu Ala Leu Leu
                485                 490                 495
Val Ala Ser Val Leu Gln Pro Asn Ile His Ala Ser His Glu Asp Ser
            500                 505                 510
Gly Lys Ala Leu Ala Pro Lys Ile Ser Ile Ser Pro Arg Thr Thr Asn
        515                 520                 525
Ser Phe His Leu Pro Asp Asp Pro Ser Ile Pro Ile Ile Met Val Gly
    530                 535                 540
Pro Gly Thr Gly Ile Ala Pro Phe Ile Gly Phe Leu Gln His Arg Glu
545                 550                 555                 560
Lys Leu Gln Glu Gln His Pro Asp Gly Asn Phe Gly Ala Met Trp Phe
                565                 570                 575
Phe Gly Cys Arg His Lys Asp Arg Asp Tyr Leu Phe Arg Lys Glu Leu
            580                 585                 590
Arg His Phe Leu Lys His Gly Ile Leu Thr His Leu Lys Val Ser Phe
        595                 600                 605
Ser Arg Asp Ala Pro Val Gly Glu Glu Glu Ala Pro Ala Lys Tyr Val
    610                 615                 620
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```
Gln Asp Asn Ile Gln Leu His Gly Gln Gln Val Ala Arg Ile Leu Leu
625                 630                 635                 640
Gln Glu Asn Gly His Ile Tyr Val Cys Gly Asp Ala Lys Asn Met Ala
                645                 650                 655
Lys Asp Val His Asp Ala Leu Val Gln Ile Ile Ser Lys Glu Val Gly
            660                 665                 670
Val Glu Lys Leu Glu Ala Met Lys Thr Leu Ala Thr Leu Lys Glu Glu
        675                 680                 685
Lys Arg Tyr Leu Gln Asp Ile Trp Ser
    690                 695
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<210> 47
<211> 2093
<212> DNA
<213> Homo sapiens

<400> 47

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tccgataagt atgacctaaa aaccgaaaca gctcctcttg ttgttgtggt ttctaccacg     180
ggcaccggag acccacccga cacagcccgc aagtttgtta aggaaataca gaaccaaaca     240
ctgccggttg atttctttgc tcacctgcgg tatgggttac tgggtctcgg tgattcagaa     300
tacacctact tttgcaatgg ggggaagata attgataaac gacttcaaga gcttggagcc     360
cggcatttct atgacactgg acatgcagat gactgtgtag gtttagaact tgtggttgag     420
ccgtggattg ctggactctg gccagccctc agaaagcatt ttaggtcaag cagaggacaa     480
gaggagataa gtggcgcact cccggtggca tcacctgcat ccttgaggac agaccttgtg     540
aagtcagagc tgctacacat tgaatctcaa gtcgagcttc tgagattcga tgattcagga     600
agaaaggatt ctgaggtttt gaagcaaaat gcagtgaaca gcaaccaatc caatgttgta     660
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aatattcctg gtttaccccc agaatattta caggtacatc tgcaggagtc tcttggccag     780
gaggaaagcc aagtatctgt gacttcagca gatccagttt ttcaagtgcc aatttcaaag     840
gcagttcaac ttactacgaa tgatgccata aaaaccactc tgctggtaga attggacatt     900
tcaaatacag acttttccta tcagcctgga gatgccttca gcgtgatctg ccctaacagt     960
gattctgagg tacaaagcct actccaaaga ctgcagcttg aagataaaag agagcactgc    1020
gtccttttga aaataaaggc agacacaaag aagaaaggag ctaccttacc ccagcatata    1080
cctgcgggat gttctctcca gttcattttt acctggtgtc ttgaaatccg agcaattcct    1140
aaaaaggcat ttttgcgagc ccttgtggac tataccagtg acagtgctga aaagcgcagg    1200
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tccaagaaca acacccagat ggaaattttg gagcaatgtg gttgtttttt ggctgcaggc    1740
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taactcatct aaaggtttcc ttctcaagag atgctcctgt tggggaggag gaagccccag    1860
caaagtatgt acaagacaac atccagcttc atggccagca ggtggcgaga atcctcctcc    1920
aggagaacgg ccatatttat gtgtgtggag atgcaaagaa tatggccaag gatgtacatg    1980
atgcccttgt gcaaataata agcaaagagg ttggagttga aaaactagaa gcaatgaaaa    2040
```

ccctggccac tttaaaagaa gaaaaacgct accttcagga tatttggtca taa 2093

<210> 48
<211> 689
<212> PRT
<213> Homo sapiens

<400> 48

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Arg Arg Phe Leu Leu Leu Tyr Ala Thr Gln Gln Gly Gln Ala Lys Ala
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Ile Ala Glu Glu Met Cys Glu Gln Ala Val Val His Gly Phe Ser Ala
            20                  25                  30
Asp Leu His Cys Ile Ser Glu Ser Asp Lys Tyr Asp Leu Lys Thr Glu
        35                  40                  45
Thr Ala Pro Leu Val Val Val Val Ser Thr Thr Gly Thr Gly Asp Pro
    50                  55                  60
Pro Asp Thr Ala Arg Lys Phe Val Lys Glu Ile Gln Asn Gln Thr Leu
65                  70                  75                  80
Pro Val Asp Phe Phe Ala His Leu Arg Tyr Gly Leu Leu Gly Leu Gly
                85                  90                  95
Asp Ser Glu Tyr Thr Tyr Phe Cys Asn Gly Gly Lys Ile Ile Asp Lys
            100                 105                 110
Arg Leu Gln Glu Leu Gly Ala Arg His Phe Tyr Asp Thr Gly His Ala
        115                 120                 125
Asp Asp Cys Val Gly Leu Glu Leu Val Val Glu Pro Trp Ile Ala Gly
    130                 135                 140
Leu Trp Pro Ala Leu Arg Lys His Phe Arg Ser Ser Arg Gly Gln Glu
145                 150                 155                 160
Glu Ile Ser Gly Ala Leu Pro Val Ala Ser Pro Ala Ser Leu Arg Thr
                165                 170                 175
Asp Leu Val Lys Ser Glu Leu Leu His Ile Glu Ser Gln Val Glu Leu
            180                 185                 190
Leu Arg Phe Asp Asp Ser Gly Arg Lys Asp Ser Glu Val Leu Lys Gln
        195                 200                 205
Asn Ala Val Asn Ser Asn Gln Ser Asn Val Val Ile Glu Asp Phe Glu
    210                 215                 220
Ser Ser Leu Thr Arg Ser Val Pro Pro Leu Ser Gln Ala Ser Leu Asn
225                 230                 235                 240
Ile Pro Gly Leu Pro Pro Glu Tyr Leu Gln Val His Leu Gln Glu Ser
                245                 250                 255
Leu Gly Gln Glu Glu Ser Gln Val Ser Val Thr Ser Ala Asp Pro Val
            260                 265                 270
Phe Gln Val Pro Ile Ser Lys Ala Val Gln Leu Thr Thr Asn Asp Ala
        275                 280                 285
Ile Lys Thr Thr Leu Leu Val Glu Leu Asp Ile Ser Asn Thr Asp Phe
    290                 295                 300
Ser Tyr Gln Pro Gly Asp Ala Phe Ser Val Ile Cys Pro Asn Ser Asp
305                 310                 315                 320
Ser Glu Val Gln Ser Leu Leu Gln Arg Leu Gln Leu Glu Asp Lys Arg
                325                 330                 335
Glu His Cys Val Leu Leu Lys Ile Lys Ala Asp Thr Lys Lys Lys Gly
```

```
            340                 345                 350
Ala Thr Leu Pro Gln His Ile Pro Ala Gly Cys Ser Leu Gln Phe Ile
        355                 360                 365
Phe Thr Trp Cys Leu Glu Ile Arg Ala Ile Pro Lys Lys Ala Phe Leu
    370                 375                 380
Arg Ala Leu Val Asp Tyr Thr Ser Asp Ser Ala Glu Lys Arg Arg Leu
385                 390                 395                 400
Gln Glu Leu Cys Ser Lys Gln Gly Ala Ala Asp Tyr Ser Arg Phe Val
                405                 410                 415
Arg Asp Ala Cys Ala Cys Leu Leu Asp Leu Leu Leu Ala Phe Pro Ser
            420                 425                 430
Cys Gln Pro Pro Leu Ser Leu Leu Leu Glu His Leu Pro Lys Leu Gln
        435                 440                 445
Pro Arg Pro Tyr Ser Cys Ala Ser Ser Ser Leu Phe His Pro Gly Lys
    450                 455                 460
Leu His Phe Val Phe Asn Ile Val Glu Phe Leu Ser Thr Ala Thr Thr
465                 470                 475                 480
Glu Val Leu Arg Lys Gly Val Cys Thr Gly Trp Leu Ala Leu Leu Val
                485                 490                 495
Ala Ser Val Leu Gln Pro Asn Ile His Ala Ser His Glu Asp Ser Gly
            500                 505                 510
Lys Ala Leu Ala Pro Lys Ile Ser Ile Ser Pro Arg Thr Thr Asn Ser
        515                 520                 525
Phe His Leu Pro Asp Asp Pro Ser Ile Pro Ile Ile Met Val Gly Pro
    530                 535                 540
Gly Thr Gly Ile Ala Pro Phe Ile Gly Phe Leu Gln His Arg Asn Ser
545                 550                 555                 560
Lys Asn Asn Thr Gln Met Glu Ile Leu Glu Gln Cys Gly Cys Phe Leu
                565                 570                 575
Ala Ala Gly Ile Arg Ile Gly Ile Ile Tyr Ser Glu Lys Ser Ser Asp
            580                 585                 590
Ile Ser Leu Ser Met Gly Ser Leu Ile Arg Phe Pro Ser Gln Glu Met
        595                 600                 605
Leu Leu Leu Gly Arg Arg Lys Pro Gln Gln Ser Met Tyr Lys Thr Thr
    610                 615                 620
Ser Ser Phe Met Ala Ser Arg Trp Arg Glu Ser Ser Ser Arg Arg Thr
625                 630                 635                 640
Ala Ile Phe Met Cys Val Glu Met Gln Arg Ile Trp Pro Arg Met Tyr
                645                 650                 655
Met Met Pro Leu Cys Lys Ala Lys Arg Leu Glu Leu Lys Asn Lys Gln
            660                 665                 670
Lys Pro Trp Pro Leu Lys Lys Lys Asn Ala Thr Phe Arg Ile Phe Gly
        675                 680                 685
His
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<210> 49
<211> 23
<212> DNA
<213> Homo sapiens

<400> 49
gcaaaggcca tcgcagaaga cat 23

<210> 50
<211> 26
<212> DNA
<213> Homo sapiens

<400> 50
gtgaagatct gcagaaaatc catgta 26

<210> 51
<211> 2187
<212> DNA
<213> Homo sapiens

<400> 51
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